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1 [Concurrency control for distributed multiversion databases through time intervals](#)



Ugur Halici, Asuman Dogac

April 1991 **Proceedings of the 19th annual conference on Computer Science**

**Publisher:** ACM Press

Full text available:  pdf(724.05 KB) Additional Information: [full citation](#), [references](#)

**Keywords:** concurrency control, distributed database systems, multiversion data, serializability, time intervals, timestamps

2 [The role of time in information processing: a survey](#)



A. Bolour, T. L. Anderson, L. J. Dekeyser, H. K. T. Wong

April 1982 **ACM SIGMOD Record**, Volume 12 Issue 3

**Publisher:** ACM Press

Full text available:  pdf(2.16 MB) Additional Information: [full citation](#), [references](#), [citations](#)

3 [Comparison of access methods for time-evolving data](#)



Betty Salzberg, Vassilis J. Tsotras

June 1999 **ACM Computing Surveys (CSUR)**, Volume 31 Issue 2

**Publisher:** ACM Press

Full text available:  pdf(529.53 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper compares different indexing techniques proposed for supporting efficient access to temporal data. The comparison is based on a collection of important performance criteria, including the space consumed, update processing, and query time for representative queries. The comparison is based on worst-case analysis, hence no assumptions on data distribution or query frequencies are made. When a number of methods have the same asymptotic worst-case behavior, features in the methods tha ...

**Keywords:** I/O performance, access methods, structures, temporal databases

4 [Locally adaptive dimensionality reduction for indexing large time series databases](#)



Kaushik Chakrabarti, Eamonn Keogh, Sharad Mehrotra, Michael Pazzani  
June 2002 **ACM Transactions on Database Systems (TODS)**, Volume 27 Issue 2

**Publisher:** ACM Press

Full text available: pdf(1.48 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Similarity search in large time series databases has attracted much research interest recently. It is a difficult problem because of the typically high dimensionality of the data. The most promising solutions involve performing dimensionality reduction on the data, then indexing the reduced data with a multidimensional index structure. Many dimensionality reduction techniques have been proposed, including Singular Value Decomposition (SVD), the Discrete Fourier transform (DFT), and the Discrete ...

**Keywords:** Dimensionality reduction, indexing, time-series similarity retrieval

## 5 Data streams and time-series: Mining temporal classes from time series data



Masahiro Motoyoshi, Takao Miura, Kohei Watanabe

November 2002 **Proceedings of the eleventh international conference on Information and knowledge management**

**Publisher:** ACM Press

Full text available: pdf(179.33 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this investigation, we discuss how to mine *Temporal Class Schemes* to model a collection of time series data. From the viewpoint of temporal data mining, this problem can be seen as *discretizing* time series data or aggregating them. Also this can be considered as screening (or noise filtering). From the viewpoint of temporal databases, the issue is how we represent the data and how we can obtain intensional aspects as temporal schemes. In other words, we discuss scheme discovery ...

**Keywords:** data mining, scheme discovery, temporal scheme, time series data

## 6 Locally adaptive dimensionality reduction for indexing large time series databases



Eamonn Keogh, Kaushik Chakrabarti, Michael Pazzani, Sharad Mehrotra

May 2001 **ACM SIGMOD Record , Proceedings of the 2001 ACM SIGMOD international conference on Management of data SIGMOD '01**, Volume 30 Issue 2

**Publisher:** ACM Press

Full text available: pdf(300.08 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Similarity search in large time series databases has attracted much research interest recently. It is a difficult problem because of the typically high dimensionality of the data.. The most promising solutions involve performing dimensionality reduction on the data, then indexing the reduced data with a multidimensional index structure. Many dimensionality reduction techniques have been proposed, including Singular Value Decomposition (SVD), the Discrete Fourier transform (DFT), and the Discr ...

**Keywords:** content-based retrieval, dimensionality reduction, indexing

## 7 Research perspectives for time series management systems



Werner Dreyer, Angelika Kotz Dittrich, Duri Schmidt

March 1994 **ACM SIGMOD Record**, Volume 23 Issue 1

**Publisher:** ACM Press

Full text available: pdf(693.92 KB)

Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

Empirical research based on time series is a data intensive activity that needs a data base management system (DBMS). We investigate the special properties a time series management system (TSMS) should have. We then show that currently available solutions and related research directions are not well suited to handle the existing problems. Therefore, we propose the development of a special purpose TSMS, which will offer particular modeling, retrieval, and computation capabilities. It will be suit ...

8 Poster papers: Finding surprising patterns in a time series database in linear time and space



Eamonn Keogh, Stefano Lonardi, Bill 'Yuan-chi' Chiu

July 2002 **Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining**

**Publisher:** ACM Press

Full text available: pdf(686.15 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The problem of finding a specified pattern in a time series database (i.e. query by content) has received much attention and is now a relatively mature field. In contrast, the important problem of enumerating all surprising or interesting patterns has received far less attention. This problem requires a meaningful definition of "surprise", and an efficient search technique. All previous attempts at finding surprising patterns in time series use a very limited notion of surprise, and/or do not sc ...

**Keywords:** Markov Model, anomaly detection, feature extraction, novelty detection, suffix tree, time series

9 Quickly generating billion-record synthetic databases



Jim Gray, Prakash Sundaresan, Susanne Englert, Ken Baclawski, Peter J. Weinberger

May 1994 **ACM SIGMOD Record , Proceedings of the 1994 ACM SIGMOD international conference on Management of data SIGMOD '94**, Volume 23 Issue 2

**Publisher:** ACM Press

Full text available: pdf(1.11 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Evaluating database system performance often requires generating synthetic databases—ones having certain statistical properties but filled with dummy information. When evaluating different database designs, it is often necessary to generate several databases and evaluate each design. As database sizes grow to terabytes, generation often takes longer than evaluation. This paper presents several database generation techniques. In particular it discusses: (1) Parallelism to get generatio ...

10 Industrial sessions: database applications: SoundCompass: a practical query-by-humming system; normalization of scalable and shiftable time-series data and effective subsequence generation



Naoko Kosugi, Yasushi Sakurai, Masashi Morimoto

June 2004 **Proceedings of the 2004 ACM SIGMOD international conference on Management of data**

**Publisher:** ACM Press

Full text available: pdf(231.82 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

This paper describes our practical query-by-humming system, *SoundCompass*, which is being used as a karaoke song selection system in Japan. First, we describe the fundamental techniques employed by SoundCompass such as normalization in a time-wise sense of music data, time-scalable and tone-shiftable time-series data, and making subsequences for efficient matching. Second, we describe techniques to make effective feature vectors based on real music data and do matching with them to develop ...

11 Indexing Multidimensional Time-Series

Michail Vlachos, Marios Hadjieleftheriou, Dimitrios Gunopulos, Eamonn Keogh  
January 2006 **The VLDB Journal – The International Journal on Very Large Data**

**Bases**, Volume 15 Issue 1

**Publisher:** Springer-Verlag New York, Inc.

Full text available:  pdf(1.20 MB) Additional Information: [full citation](#), [abstract](#)

While most time series data mining research has concentrated on providing solutions for a single distance function, in this work we motivate the need for an index structure that can support multiple distance measures. Our specific area of interest is the efficient retrieval and analysis of similar trajectories. Trajectory datasets are very common in environmental applications, mobility experiments, and video surveillance and are especially important for the discovery of certain biological patten ...

**Keywords:** Dynamic time warping, Ensemble index, Longest common subsequence, Motion capture, Trajectories


12 Supporting valid-time indeterminacy



Curtis E. Dyreson, Richard Thomas Snodgrass

March 1998 **ACM Transactions on Database Systems (TODS)**, Volume 23 Issue 1

**Publisher:** ACM Press

Full text available:  pdf(516.09 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In valid-time indeterminacy it is known that an event stored in a database did in fact occur, but it is not known exactly when. In this paper we extend the SQL data model and query language to support valid-time indeterminacy. We represent the occurrence time of an event with a set of possible instants, delimiting when the event might have occurred, and a probability distribution over that set. We also describe query language constructs to retrieve informat ...

**Keywords:** SQL, TSQL2, incomplete information, indeterminacy, probabilistic information, temporal database, valid-time database

13 Concurrency Control in Distributed Database Systems



Philip A. Bernstein, Nathan Goodman

June 1981 **ACM Computing Surveys (CSUR)**, Volume 13 Issue 2

**Publisher:** ACM Press

Full text available:  pdf(3.24 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)


14 Beyond intratransaction association analysis: mining multidimensional intertransaction association rules



Hongjun Lu, Ling Feng, Jiawei Han

October 2000 **ACM Transactions on Information Systems (TOIS)**, Volume 18 Issue 4

**Publisher:** ACM Press

Full text available:  pdf(1.31 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper, we extend the scope of mining association rules from traditional single-dimensional intratransaction associations, to multidimensional intertransaction associations. Intratransaction associations are the associations among items with the same transaction, where the notion of the transaction could be the items bought by the

same customer, the events happened on the same day, and so on. However, an intertransaction association ...

**Keywords:** association rules, data mining, intra/intertransaction, multidimensional context

#### 15 Authentication: Forensic analysis of database tampering



Kyriacos Pavlou, Richard T. Snodgrass

June 2006 **Proceedings of the 2006 ACM SIGMOD international conference on Management of data SIGMOD '06**

**Publisher:** ACM Press

Full text available: [pdf\(244.49 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Mechanisms now exist that detect tampering of a database, through the use of cryptographically-strong hash functions. This paper addresses the next problem, that of determining who, when, and what, by providing a systematic means of performing forensic analysis after such tampering has been uncovered. We introduce a schematic representation termed a "corruption diagram" that aids in intrusion investigation. We use these diagrams to fully analyze the original proposal, that of a linked sequence o ...

**Keywords:** append-only, corruption diagram, cryptographic hash function, forensic strength

#### 16 A dynamic database reorganization algorithm



S. B. Yao, K. S. Das, T. J. Teorey

June 1976 **ACM Transactions on Database Systems (TODS)**, Volume 1 Issue 2

**Publisher:** ACM Press

Full text available: [pdf\(960.36 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Reorganization is necessary in some databases for overcoming the performance deterioration caused by updates. The paper presents a dynamic reorganization algorithm which makes the reorganization decision by measuring the database search costs. Previously, the reorganization intervals could only be determined for linear deterioration and known database lifetime. It is shown that the dynamic reorganization algorithm is near optimum for constant reorganization cost and is superior for increasi ...

**Keywords:** database, file organization, information retrieval, reorganization

#### 17 Fast subsequence matching in time-series databases



Christos Faloutsos, M. Ranganathan, Yannis Manolopoulos

May 1994 **ACM SIGMOD Record , Proceedings of the 1994 ACM SIGMOD international conference on Management of data SIGMOD '94**, Volume 23 Issue 2

**Publisher:** ACM Press

Full text available: [pdf\(1.01 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present an efficient indexing method to locate 1-dimensional subsequences within a collection of sequences, such that the subsequences match a given (query) pattern within a specified tolerance. The idea is to map each data sequences into a small set of multidimensional rectangles in feature space. Then, these rectangles can be readily indexed using traditional spatial access methods, like the R\*-tree [9]. In more detail, we use a sliding window over the data sequence and extract its fea ...

18 External memory algorithms and data structures: dealing with massive data



Jeffrey Scott Vitter

June 2001 **ACM Computing Surveys (CSUR)**, Volume 33 Issue 2

**Publisher:** ACM Press

Full text available: pdf(828.46 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Data sets in large applications are often too massive to fit completely inside the computers internal memory. The resulting input/output communication (or I/O) between fast internal memory and slower external memory (such as disks) can be a major performance bottleneck. In this article we survey the state of the art in the design and analysis of external memory (or EM) algorithms and data structures, where the goal is to exploit locality in order to reduce the I/O costs. We consider a varie ...

**Keywords:** B-tree, I/O, batched, block, disk, dynamic, extendible hashing, external memory, hierarchical memory, multidimensional access methods, multilevel memory, online, out-of-core, secondary storage, sorting

19 Effective timestamping in databases

Kristian Torp, Christian S. Jensen, Richard Thomas Snodgrass

February 2000 **The VLDB Journal – The International Journal on Very Large Data Bases**, Volume 8 Issue 3-4

**Publisher:** Springer-Verlag New York, Inc.

Full text available: pdf(198.04 KB) Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

Many existing database applications place various timestamps on their data, rendering temporal values such as dates and times prevalent in database tables. During the past two decades, several dozen temporal data models have appeared, all with timestamps being integral components. The models have used timestamps for encoding two specific temporal aspects of database facts, namely transaction time, when the facts are current in the database, and valid time, when the facts are true in the modeled ...

**Keywords:** Timestamping, Transactions

20 Index interpolation: an approach to subsequence matching supporting normalization transform in time-series databases



Woong-Kee Loh, Sang-Wook Kim, Kyu-Young Whang

November 2000 **Proceedings of the ninth international conference on Information and knowledge management**

**Publisher:** ACM Press

Full text available: pdf(245.67 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

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### 1 [Research sessions: similarity and matching: Continually evaluating similarity-based pattern queries on a streaming time series](#)

Like Gao, X. Sean Wang

June 2002 **Proceedings of the 2002 ACM SIGMOD international conference on Management of data SIGMOD '02**

Publisher: ACM Press

Full text available: [pdf\(1.22 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In many applications, local or remote sensors send in streams of data, and the system needs to monitor the streams to discover relevant events/patterns and deliver instant reaction correspondingly. An important scenario is that the incoming stream is a continually appended time series, and the patterns are time series in a database. At each time when a new value arrives (called a time position), the system needs to find, from the database, the nearest or near neighbors of the incoming time series ...

### 2 [Processing time-constrained aggregate queries in CASE-DB](#)

Wen-Chi Hou, Gultekin Ozsoyoglu

June 1993 **ACM Transactions on Database Systems (TODS)**, Volume 18 Issue 2

Publisher: ACM Press

Full text available: [pdf\(2.62 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

In this paper, we present an algorithm to strictly control the time to process an estimator for an aggregate relational query. The algorithm implemented in a prototype database management system, called CASE-DB, iteratively samples from input relations, and evaluates the associated estimator until the time quota expires. In order to estimate the time cost of a query, CASE-DB uses adaptive time cost formulas. The formulas are adaptive in that the parameters of the formulas can be ...

**Keywords:** estimation, relational algebra, risk of overspending, sampling, selectivity, time constraints

### 3 [Query processing and optimization: Time relaxed spatiotemporal trajectory joins](#)

Petko Bakalov, Marios Hadjieleftheriou, Vassilis J. Tsotras

November 2005 **Proceedings of the 13th annual ACM international workshop on Geographic information systems GIS '05**

**Publisher:** ACM Press

Full text available:  pdf(275.80 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Many spatiotemporal applications store moving object data in the form of trajectories. Various recent works have addressed interesting queries on trajectorial data, mainly focusing on range queries and Nearest Neighbor queries. Here we examine another interesting query, the Time Relaxed Spatiotemporal Trajectory Join (TRSTJ) which effectively finds groups of moving objects that have followed similar movements in different times. We first attempt to address the TRSTJ problem using a symbolic repr ...

**Keywords:** indexing, join, trajectory


4 Data streams and time-series: Evaluating continuous nearest neighbor queries for streaming time series via pre-fetching



Like Gao, Zhengrong Yao, X. Sean Wang

November 2002 **Proceedings of the eleventh international conference on Information and knowledge management**

**Publisher:** ACM Press

Full text available:  pdf(231.86 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

For many applications, it is important to quickly locate the nearest neighbor of a given time series. When the given time series is a streaming one, nearest neighbors may need to be found continuously at all time positions. Such a standing request is called a *continuous nearest neighbor query*. This paper seeks fast evaluation of continuous queries on large databases. The initial strategy is to use the result of one evaluation to restrict the search space for the next. A more fundamental i ...

**Keywords:** continuous query, nearest neighbor, streaming time series

5 The role of time in information processing: a survey



A. Bolour, T. L. Anderson, L. J. Dekeyser, H. K. T. Wong

April 1982 **ACM SIGMOD Record**, Volume 12 Issue 3

**Publisher:** ACM Press

Full text available:  pdf(2.16 MB) Additional Information: [full citation](#), [references](#), [citations](#)

6 Artificial intelligence, speech, recognition, and data mining: Discovering all frequent trends in time series

Ajumobi Udechukwu, Ken Barker, Reda Alhajj

January 2004 **Proceedings of the winter international symposium on Information and communication technologies WISICT '04**


**Publisher:** Trinity College Dublin

Full text available:  pdf(147.45 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

Several techniques have been proposed for translating and mining time series. The translation schemes are typically based on passing a window over the time series and extracting features from the data lying within the window. The use of windows in time series translation has been shown to be effective in indexing and querying similar time series. However, for applications involving the identification of frequent patterns in time series, and finding pattern associations existing in single or mult ...

7 Research sessions: stream management: Online event-driven subsequence matching over financial data streams




-  Huanmei Wu, Betty Salzberg, Donghui Zhang  
June 2004 **Proceedings of the 2004 ACM SIGMOD international conference on Management of data**

**Publisher:** ACM Press

Full text available:  [pdf\(753.59 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

Subsequence similarity matching in time series databases is an important research area for many applications. This paper presents a new approximate approach for automatic online subsequence similarity matching over massive data streams. With a simultaneous on-line segmentation and pruning algorithm over the incoming stream, the resulting piecewise linear representation of the data stream features high sensitivity and accuracy. The similarity definition is based on a permutation followed by a met ...


8 Time series similarity measures (tutorial PM-2)

-  Dimitrios Gunopulos, Gautam Das  
August 2000 **Tutorial notes of the sixth ACM SIGKDD international conference on Knowledge discovery and data mining**

**Publisher:** ACM Press

Full text available:  [pdf\(1.42 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

9 The role of time in information processing: a survey

-  A. Bolour, T. L. Anderson, L. J. Dekeyser, H. K. T. Wong  
April 1982 **ACM SIGART Bulletin**, Issue 80

**Publisher:** ACM Press

Full text available:  [pdf\(2.12 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

Numerous researchers in a handful of disciplines have been concerned, in recent years, with the special role (or roles) that time seems to play in information processing. Designers of computerized information systems have had to deal with the fact that when an information item becomes outdated, it need not be forgotten. Researchers in artificial intelligence have pointed to the need for a realistic world model to include representations not only for snapshot descriptions of the real world, but a ...

10 Indexing Multidimensional Time-Series

Michail Vlachos, Marios Hadjieleftheriou, Dimitrios Gunopulos, Eamonn Keogh  
January 2006 **The VLDB Journal – The International Journal on Very Large Data Bases**, Volume 15 Issue 1

**Publisher:** Springer-Verlag New York, Inc.

Full text available:  [pdf\(1.20 MB\)](#) Additional Information: [full citation](#), [abstract](#)


While most time series data mining research has concentrated on providing solutions for a single distance function, in this work we motivate the need for an index structure that can support multiple distance measures. Our specific area of interest is the efficient retrieval and analysis of similar trajectories. Trajectory datasets are very common in environmental applications, mobility experiments, and video surveillance and are especially important for the discovery of certain biological patten ...

**Keywords:** Dynamic time warping, Ensemble index, Longest common subsequence, Motion capture, Trajectories

11 Nearest and reverse nearest neighbor queries for moving objects

Rimantas Benetis, S. Jensen, Gytis Karčiauskas, Simonas Šaltenis  
September 2006 **The VLDB Journal – The International Journal on Very Large Data Bases**, Volume 15 Issue 3

**Publisher:** Springer-Verlag New York, Inc.

Full text available:  pdf(790.23 KB) Additional Information: [full citation](#), [abstract](#)

With the continued proliferation of wireless communications and advances in positioning technologies, algorithms for efficiently answering queries about large populations of moving objects are gaining interest. This paper proposes algorithms for  $k$  nearest and reverse  $k$  nearest neighbor queries on the current and anticipated future positions of points moving continuously in the plane. The former type of query returns  $k$  objects nearest to a query object for each time point dur ...


**Keywords:** Continuous queries, Incremental update, Location-based services, Mobile objects, Neighbor queries, Persistent queries

12 Moving objects: Efficient trajectory joins using symbolic representations



Petko Bakalov, Marios Hadjieleftheriou, Eamonn Keogh, Vassilis J. Tsotras  
May 2005 **Proceedings of the 6th international conference on Mobile data management MDM '05**

**Publisher:** ACM Press

Full text available:  pdf(235.44 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Efficiently and accurately discovering similarities among moving object trajectories is a difficult problem that appears in many spatiotemporal applications. In this paper we consider how to efficiently evaluate trajectory joins, i.e., how to identify all pairs of similar trajectories between two datasets. Our approach represents an object trajectory as a sequence of symbols (i.e., a string). Based on special lower-bounding distances between two strings, we propose a pruning heuristic for reduci ...

**Keywords:** indexing, join, trajectory

13 Moving objects: Efficient indexing of the historical, present, and future positions of moving objects



Dan Lin, Christian S. Jensen, Beng Chin Ooi, Simonas Šaltenis  
May 2005 **Proceedings of the 6th international conference on Mobile data management MDM '05**

**Publisher:** ACM Press

Full text available:  pdf(155.14 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Although significant effort has been put into the development of efficient spatio-temporal indexing techniques for moving objects, little attention has been given to the development of techniques that efficiently support queries about the past, present, and future positions of objects. The provisioning of such techniques is challenging, both because of the nature of the data, which reflects continuous movement, and because of the types of queries to be supported. This paper proposes the BB<sup><</sup> ...

**Keywords:** B-tree, indexing, mobile objects

14 Index interpolation: an approach to subsequence matching supporting normalization transform in time-series databases



Woong-Kee Loh, Sang-Wook Kim, Kyu-Young Whang  
November 2000 **Proceedings of the ninth international conference on Information and knowledge management**

**Publisher:** ACM Press

Full text available:  pdf(245.67 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

15 Mobile computing and applications (MCA): Location dependent query proxy



Xing Gao, Ali R. Hurson

March 2005 **Proceedings of the 2005 ACM symposium on Applied computing SAC '05**

**Publisher:** ACM Press

Full text available: pdf(455.99 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In a mobile environment, the result of queries often depends on the client's location. These queries are called location dependent queries (LDQ). Applying the concept of caching to LDQs provides a means for efficient processing when queries exhibit both semantic similarity and spatial locality. Existing LDQ caching schemes require database (DB) servers to provide validity regions (VR) for LDQ results, which introduces significant processing and/or storage overhead. As a result, DB servers may on ...

**Keywords:** caching, location dependent query, proxy, validity region

16 Temporal aggregation in active database rules



Iakovos Motakis, Carlo Zaniolo

June 1997 **ACM SIGMOD Record , Proceedings of the 1997 ACM SIGMOD international conference on Management of data SIGMOD '97**, Volume 26 Issue 2

**Publisher:** ACM Press

Full text available: pdf(1.52 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

An important feature of many advanced active database prototypes is support for rules triggered by complex patterns of events. Their composite event languages provide powerful primitives for event-based temporal reasoning. In fact, with one important exception, their expressive power matches and surpasses that of sophisticated languages offered by Time Series Management Systems (TSMS), which have been extensively used for temporal data analysis and knowledge discovery. This exception pertai ...

17 Research sessions: P2P and sensor networks: The price of validity in dynamic networks



Mayank Bawa, Aristides Gionis, Hector Garcia-Molina, Rajeev Motwani

June 2004 **Proceedings of the 2004 ACM SIGMOD international conference on Management of data**

**Publisher:** ACM Press

Full text available: pdf(254.64 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

Massive-scale self-administered networks like Peer-to-Peer and Sensor Networks have data distributed across thousands of participant hosts. These networks are highly dynamic with short-lived hosts being the norm rather than an exception. In recent years, researchers have investigated *best-effort* algorithms to efficiently process aggregate queries (e.g., sum, count, average, minimum and maximum) [6, 13, 21, 34, 35, 37] on these networks. Unfortunately, query semantics for best-effort algor ...

18 A subsequence matching algorithm supporting moving average transform of arbitrary order in time-series databases using index interpolation

Woong-Kee Loh, Sang-Wook Kim

January 2001 **Proceedings of the 12th Australasian database conference ADC '01**

**Publisher:** IEEE Computer Society

Full text available: pdf(783.60 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)  
 [Publisher Site](#)

In this paper, we propose a subsequence matching algorithm that supports moving average transform of arbitrary order in time-series databases. The existing subsequence matching algorithm by Faloutsos et al. would require an index for each moving average order, which causes serious storage and CPU time overhead. In this paper, we solve the problem using index interpolation. The proposed algorithm can use only a few indexes for pre-selected moving average orders  $k$  and performs subsequence matching ...

**Keywords:** index interpolation, moving average transform, subsequence matching, time-series databases

19 Doctorial Consortium: Interactive querying of time series data



Harry Hochheiser

April 2002 **CHI '02 extended abstracts on Human factors in computing systems**

**Publisher:** ACM Press

Full text available: pdf(201.47 KB) Additional Information: [full citation](#), [abstract](#), [references](#)

Identification of patterns in time series data sets is a task that arises in a wide variety of application domains [4]. This paper presents a user interface for the timebox query model of rectangular regions that specify constraints over time series data sets. A prototype application based on timeboxes is presented. Collaborations with potential users will guide the design of enhanced functionality. Usability tests and controlled experiments will be conducted to evaluate the timebox query model.

**Keywords:** dynamic queries, graphical user interface, information visualization, time series

20 TTL Prediction schemes and the effects of inter-update time distribution on wireless data access

Yuguang Fang, Zygmunt J. Haas, Ben Liang, Yi-Bing Lin

September 2004 **Wireless Networks**, Volume 10 Issue 5

**Publisher:** Kluwer Academic Publishers

Full text available: pdf(279.80 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Modern mobile networks, such as GPRS and UMTS, support wireless data applications. One successful example is the ever popular i-Mode in Japan. Wireless data services (wireless Internet) become more important as more and more customers of handheld devices enjoy the convenience of the ubiquitous computing. To improve the effective wireless data access, the time-to-live (TTL) management for data entries becomes important due to its use in effective caching design. In this paper, we study three T ...

**Keywords:** caching, time-to-live (TTL), weakly consistency, wireless data

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Kashino, K.; Smith, G.; Murase, H.;  
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- ☐ **1. Extensions to optimistic concurrency control with time intervals**  
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12-14 Dec. 2000 Page(s):108 - 115  
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Sorce, A.; Rizzo, F.;  
[Scientific and Statistical Database Management, 1998. Proceedings. Tenth Int Conference on](#)  
1-3 July 1998 Page(s):226 - 228  
Digital Object Identifier 10.1109/SSDM.1998.688129  
[AbstractPlus](#) | Full Text: [PDF\(16 KB\)](#) IEEE CNF  
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- ☐ 2. **Computational indexes for time series**  
Falkenroth, E.;  
[Scientific and Statistical Database Systems, 1996. Proceedings. Eighth Intern Conference on](#)  
18-20 June 1996 Page(s):242 - 251  
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- ☐ 1. **Modal time-series structure in a shallow-water environment [Hudson Can**  
Knobles, D.P.; Westwood, E.K.; Le Mond, J.E.;  
[Oceanic Engineering, IEEE Journal of](#)  
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- ☐ **23. Online-learning type of traveling time prediction model in expressway**  
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- 1 System and method for improving query response time in a relational database (RDB) system by managing the number of unique table aliases defined within an RDB-specific search expression**  
Inventor: KILROY JOHN F (US)      Applicant: IBM (US)  
EC:      IPC: **G06F17/30; G06F17/30**  
Publication info: **US2006195427** - 2006-08-31
- 2 Advanced scrolling for relational database applications**  
Inventor: WASON JAMES R (US)      Applicant: IBM (US)  
EC:      IPC: **G06F17/30; G06F17/30**  
Publication info: **US2006095409** - 2006-05-04
- 3 Table duplication method for relational database**  
Inventor: CHEN FU-LI (TW)      Applicant: DIGITAL UNITED INC (TW)  
EC:      IPC: (IPC1-7): **G06F17/30**  
Publication info: **TW231908B** - 2005-05-01
- 4 Statistical natural language processing algorithm for use with massively parallel relational database management system**  
Inventor: MITCHELL JONATHON J (US)      Applicant: GREENTREE GROUP  
EC:      IPC: **G06F17/30; G06F17/30**  
Publication info: **US2006080315** - 2006-04-13
- 5 Real-time database update transaction with disconnected relational database clients**  
Inventor: WILMOT GERALD J (US)      Applicant:  
EC: **G06F17/30B**      IPC: **G06F12/00; G06F17/30; G06F12/00 (+1)**  
Publication info: **US2006010178** - 2006-01-12
- 6 Support vector machines in a relational database management system**  
Inventor: MILENOVA BORIANA L (US); YARMUS JOSEPH S (US); (+2)      Applicant:  
EC:      IPC: **G06F17/00; G06F17/00; (IPC1-7): G06F17/00**  
Publication info: **US2005050087** - 2005-03-03
- 7 Systems and methods for extracting data sets from an online relational database into a data warehouse**  
Inventor: GUNTHER CHRISTIAN (DE); AAKOLK MICHAEL (DE); (+2)      Applicant:  
EC: **G06F17/30B**      IPC: **G06F17/30; G06F17/30; (IPC1-7): G06F17/00**  
Publication info: **US2005065944** - 2005-03-24
- 8 Relational database management system having integrated non-relational multi-dimensional data store of aggregated data elements**  
Inventor: BAKALASH REUVEN (IL); SHAKED GUY (IL); (+1)      Applicant:  
EC: **C03B37/027B; G06F17/30B; (+1)**      IPC: **C03B37/027; G06F17/30; C03B37/02 (+2)**  
Publication info: **US2005091237** - 2005-04-28
- 9 REAL-TIME AGGREGATION OF UNSTRUCTURED DATA INTO STRUCTURED DATA FOR SQL PROCESSING BY A RELATIONAL DATABASE ENGINE**  
Inventor: CHOI ARTHUR; LEYBA TODD; (+2)      Applicant: IBM (US); IBM FRANCE (FR)  
EC: **G06F17/30H**      IPC: **G06F17/30; G06F17/30; (IPC1-7): G06F17/30**  
Publication info: **WO2004084092** - 2004-09-30

**10 Method and apparatus for entity removal from a content management solution implementing time-based flagging for certainty in a relational database environment**

**Inventor:** BENSON DONALD E (US); GALLAGHER

**Applicant:** IBM

EDWARD J (US); (+2)

**EC:** G06F17/30D

**IPC:** *G06F17/30*; *G06F17/30*; (IPC1-7): G06F17/30

**Publication info:** **US2005160078** - 2005-07-21

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### 11 REAL TIME MAINTENANCE OF A RELATIONAL DATABASE

Inventor: KLOSTERHALFEN JORG (DE); SMETS HEINZ- Applicant: SOFTWARE ENGINEERING GMBH (DE)  
DIETER (DE)

EC: IPC: **G06F11/34; G06F17/00; G06F17/30** (+5)

Publication info: **CA2454230** - 2004-08-27

### 12 Low-latency method to replace SQL insert for bulk data transfer to relational database

Inventor: SKOPEC MICHAEL (US); BARTHOLF PAUL Applicant:  
(US)

EC: **G06F17/30B** IPC: **G06F17/00; G06F17/30; G06F17/00** (+2)

Publication info: **US2004128299** - 2004-07-01

### 13 Apparatus, system and method for automated and adaptive digital image/video surveillance for events and configurations using a rich multimedia relational database

Inventor: RUIZ ANTONIO (US); MEYERS JOHN VANCE Applicant:  
(US)

EC: IPC: **G06F7/00; G06F7/00; (IPC1-7): G06F7/00**

Publication info: **US2004143602** - 2004-07-22

### 14 Relational database method for accessing information useful for the manufacture of, to interconnect nodes in, to repair and to maintain product and system units

Inventor: BENJAMIN SCOTT JON (US); RAISANEN JOHN Applicant: LOCKHEED CORP (US)  
HANS (US)

EC: **G06Q10/00F** IPC: **G06Q10/00; G06Q10/00; (IPC1-7): G06F17/00**

Publication info: **US2004078387** - 2004-04-22

### 15 System and method for representing a relational database as a java object

Inventor: PHENIX JOHN (GB); JUDGE NICHOLAS CLIVE Applicant:  
(GB)

EC: **G06F17/30S1** IPC: **G06F7/00; G06F7/00; (IPC1-7): G06F7/00**

Publication info: **US2004230555** - 2004-11-18

### 16 Techniques for managing what-if analysis of data managed by a relational database system

Inventor: HOPEMAN A A (US); CAREY JAMES (US); Applicant: ORACLE INT CORP (US)  
(+4)

EC: **G06F17/30S1** IPC: **G06F12/00; G06F17/30; G06F12/00** (+3)

Publication info: **US2003204534** - 2003-10-30

### 17 Object persistence to relational database within run-time environment supporting attributes and reflection

Inventor: LIN TSER YENG (US) Applicant:

EC: **G06F17/30B** IPC: **G06F17/30; G06F17/30; (IPC1-7): G06F7/00**

Publication info: **US2004010498** - 2004-01-15

### 18 Relational database method for accessing information useful for the manufacture of, to interconnect nodes in, to repair and to maintain product and system units

Inventor: BENJAMIN SCOTT JON (US); RAISANEN JOHN Applicant: LOCKHEED CORP (US)  
HANS (US)

EC: **G06Q10/00F** IPC: **G06Q10/00; G06Q10/00; (IPC1-7): G06F17/00**

Publication info: **US2003023611** - 2003-01-30



**19 Relational database management system having integrated non-relational multi-dimensional data store of aggregated data elements**

Inventor: BAKALASH REUVEN (IL); SHAKED GUY (IL); Applicant: (+1)

EC: G06F17/30B; G06F17/30T

IPC: **G06F17/30; G06F17/30**; (IPC1-7): G06F7/00

Publication info: **US2002194167** - 2002-12-19

**20 Real-time monitoring of service performance through the use of relational database calculation clusters**

Inventor: TACAILLE OLIVIER (FR); EYNARD FREDERIC Applicant: COMPAQ INFORMATION TECHNOLOGIE (US) (FR); (+1)

EC: H04L12/24C3

IPC: **H04L12/24; H04L12/24**; (IPC1-7): G06F7/00

Publication info: **US2003120666** - 2003-06-26

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Data supplied from the **esp@cenet** database - Worldwide

## RESULT LIST

27 results found in the Worldwide database for:

**time and series** in the title AND **database** in the title or abstract

(Results are sorted by date of upload in database)

- 1 TIME SERIES DATA COARSE VISUALIZATION ANALYZER BY POSSIBILITY DISTRIBUTION, PROGRAM FOR EVALUATING TIME SERIES DATA, AND METHOD FOR EVALUATING TIME SERIES DATA**  
Inventor: YAGYU TATSUO; WAKAHARA ATSUSHI; (+2) Applicant: NET FORCE KK  
EC: IPC: **G06N7/02; G06N3/00; G06N7/00** (+1)  
Publication info: **JP2006092353** - 2006-04-06
- 2 Program for analysis of the time-series data obtained by DNA array method, a method for analysis of the time-series data obtained by DNA array method, and a device for analysis of the time-series data obtained by DNA array method**  
Inventor: ISHIURA MASAHIRO (JP); OKAMOTO KAZUHIISA (JP) Applicant: NAT UNIVERSITY CORP NAGOYA UNI (JP)  
EC: G06F19/00C4 IPC: **C12N15/09; C12Q1/68; G06F17/30** (+8)  
Publication info: **US2006084075** - 2006-04-20
- 3 TIME SERIES DATA DISPLAY SYSTEM, AND PROGRAM FOR TIME SERIES DATA DISPLAY**  
Inventor: SASAKI HIROFUMI Applicant: I N INFORMATION SYSTEMS LTD  
EC: IPC: **G06Q10/00; G06Q10/00**  
Publication info: **JP2006053689** - 2006-02-23
- 4 Method and system for computing categories and prediction of categories utilizing time-series classification data**  
Inventor: RIETMAN EDWARD A (US) Applicant:  
EC: IPC: **G06F15/18; G06F15/18; (IPC1-7): G06F15/18**  
Publication info: **US2005010541** - 2005-01-13
- 5 Time series data management**  
Inventor: HEINZEL THOMAS (US); FOERSTER STEFAN (DE) Applicant:  
EC: G06F17/30; G06Q10/00C IPC: **G06F17/30; G06Q10/00; G06F17/30** (+4)  
Publication info: **US2004230445** - 2004-11-18
- 6 TIME SERIES DATA BACKUP METHOD, SYSTEM, AND PROGRAM AND STORAGE MEDIUM**  
Inventor: NAKAMURA YOICHI; NOGUCHI KIYOHIO; (+1) Applicant: NIPPON TELEGRAPH & TELEPHONE  
EC: IPC: **G06F12/00; G06F12/00; (IPC1-7): G06F12/00**  
Publication info: **JP2005149285** - 2005-06-09
- 7 TIME SERIES DATA SEARCH METHOD, DEVICE, AND TIME PROGRAM, AND PROGRAM STORAGE MEDIUM**  
Inventor: SAKURAI YASUSHI Applicant: NIPPON TELEGRAPH & TELEPHONE  
EC: IPC: **G06F17/10; G06F17/14; G06F17/30** (+6)  
Publication info: **JP2004348594** - 2004-12-09
- 8 SAVING METHOD FOR TIME-SERIES DATA, TIME-SERIES DATABASE SYSTEM, METHOD AND SYSTEM FOR PROCESSING TIME-SERIES DATA, TIME-SERIES DATA DISPLAY SYSTEM, AND RECORDING MEDIUM**  
Inventor: UEMURA TAKESHI; SAITO TSUNEHIO; (+4) Applicant: ASAHI GLASS CO LTD  
EC: IPC: **G06F12/00; G05B23/02; G06F12/00** (+3)  
Publication info: **JP2004030599** - 2004-01-29
- 9 Modelling, in real time, hydrodynamic behavior of multi-phase fluid**

**flow in transitory phase in pipe, comprises series of neuron networks**

**Inventor:** REY FABRET ISABELLE; HENRIOT  
VERONIQUE; (+1)

**Applicant:** INST FRANCAIS DU PETROL (FR)

**EC:** G05B17/02; G06N3/04M

**IPC:** G05B17/02; G06N3/04; G05B17/00 (+4)

**Publication info:** FR2848320 - 2004-06-11

**10 TIME SERIES RECOGNITION DEVICE, TIME SERIES RECOGNITION  
METHOD AND PROGRAM**

**Inventor:** SHIMAKAWA HIROMITSU; KAWADA RIEKO

**Applicant:** MITSUBISHI ELECTRIC CORP

**EC:**

**IPC:** G01D9/00; G01D21/00; G05B23/02 (+6)

**Publication info:** JP2003263221 - 2003-09-19

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## RESULT LIST

27 results found in the Worldwide database for:  
**time and series** in the title AND **database** in the title or abstract  
(Results are sorted by date of upload in database)

### 21 TIME-SERIES DATA RETENTION AND ADDITION SYSTEM FOR DATABASE

Inventor: HOYA TADAYUKI

Applicant: NIPPON ELECTRIC CO

EC:

IPC: **G06F17/30; G06F12/00; G06F17/30** (+6)

Publication info: **JP2000276382** - 2000-10-06

### 22 METHOD FOR STORING TIME SERIES DATA AND TIME SERIES DATABASE SYSTEM, METHOD AND SYSTEM FOR PROCESSING TIME SERIES DATA, TIME SERIES DATA DISPLAY SYSTEM, AND RECORDING MEDIUM

Inventor: UEMURA KEN (JP); SAITO TSUNEHIRO (JP); Applicant: ASAHI GLASS CO LTD (JP); UEMURA KEN (+4) (JP); (+5)

EC: G05B19/418Q

IPC: **G05B19/418; G05B19/418**; (IPC1-7): G06F17/00

Publication info: **WO9936861** - 1999-07-22

### 23 METHOD AND DEVICE FOR RETRIEVING TIME SERIES IMAGE, AND RECORDING MEDIUM HAVING RECORDED TIME SERIES IMAGE RETRIEVAL PROGRAM

Inventor: OTSUKA KAZUHIRO; HORIKOSHI TSUTOMU; Applicant: NIPPON TELEGRAPH & TELEPHONE (+1)

EC:

IPC: **G06F17/30; G06T7/00; G06T7/20** (+8)

Publication info: **JP11345342** - 1999-12-14

### 24 SPEECH ANALYSIS BY TIME SERIES EXTRACTION OF ARTICULATORY PARAMETERS, DEVICE THEREFOR, AND RECORDING MEDIUM FOR PROGRAM

Inventor: SUZUKI SHIN; OKATOME TAKESHI; (+2) Applicant: NIPPON TELEGRAPH & TELEPHONE

EC:

IPC: **G10L11/00; G10L19/00; G10L11/00** (+2)

Publication info: **JP11259097** - 1999-09-24

### 25 ESTIMATING DEVICE AND METHOD FOR CHAOS TIME SERIES

Inventor: TABUCHI HIDEYUKI; ITO YOSHIAKI

Applicant: MITSUBISHI ELECTRIC CORP

EC:

IPC: **G06F17/10; G06F17/00; G06F19/00** (+7)

Publication info: **JP11212950** - 1999-08-06

### 26 TIME SERIES DATABASE FREEZER

Inventor: ONO TSUYOSHI

Applicant: NIPPON ELECTRIC CO

EC:

IPC: **G06F12/00; G06F17/30; G06F12/00** (+3)

Publication info: **JP10031609** - 1998-02-03

### 27 Method and system for retrieving time-series information

Inventor: MARUOKA TETSUYA (JP); MASUI SHOICHI (JP) Applicant: HITACHI LTD (JP)

EC: G06F17/30H; G06F17/18; (+1)

IPC: **G06F17/18; G06F17/30; G06Q10/00** (+8)

Publication info: **US5412769** - 1995-05-02

## RESULT LIST

5 results found in the Worldwide database for:  
**time and series** in the title AND **market** in the title or abstract  
(Results are sorted by date of upload in database)

### 1 TIME SERIES DATA FORECAST METHOD AND DEVICE

Inventor: OHIRA TORU; TAKAYASU HIDEKI; (+1)

Applicant: SONY CORP

EC:

IPC: **G06Q10/00; G06F17/18; G06F19/00** (+8)

Publication info: **JP2002298064** - 2002-10-11

### 2 Statistical sample sequence classification method for time series data e.g. stock market

Inventor: DECO GUSTAVO DR (DE); SCHITTENKOPF  
CHRISTIAN (DE)

Applicant: SIEMENS AG (DE)

EC: G06F17/18

IPC: **G06F15/18; G06F17/18; G06N3/00** (+6)

Publication info: **DE19643918** - 1998-02-05

### 3 PREDICTION AND TRANSACTION ASSISTANCE DEVICE FOR TIME- SERIES DATA REGARDING MARKET TRANSACTION

Inventor: YAMADA MASUHIRO

Applicant: YAMADA MASUHIRO

EC:

IPC: **G06Q40/00; G06F17/00; G06Q10/00** (+5)

Publication info: **JP7168806** - 1995-07-04

### 4 PREDICTION AND TRANSACTION AID DEVICE FOR TIME SERIES DATA RELATING TO MARKET TRANSACTION

Inventor: YAMADA MASUHIRO

Applicant: YAMADA MASUHIRO

EC:

IPC: **G06Q40/00; G06F17/00; G06Q10/00** (+5)

Publication info: **JP7044529** - 1995-02-14

### 5 TIME SERIES PREDICTING DEVICE

Inventor: OBARA KAZUHIRO

Applicant: NIPPON TELEGRAPH & TELEPHONE

EC:

IPC: **G06F15/18; G06N1/00; G06Q10/00** (+5)

Publication info: **JP6139227** - 1994-05-20

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Data supplied from the **esp@cenet** database - Worldwide

## RESULT LIST

Approximately **68** results found in the Worldwide database for:  
**time and intervals** in the title AND **data** in the title or abstract  
(Results are sorted by date of upload in database)

- 1 Method and system for updating real-time data between intervals**  
Inventor: OWENS ROBERT (US) Applicant: ASPECT COMM CORP  
EC: IPC: **H04L12/26; H04B3/20; H04J1/16** (+7)  
Publication info: **US2006159027** - 2006-07-20
- 2 Method for measurement of systolic and diastolic time intervals**  
Inventor: POLIAC MARIUS O (US); POLIAC LIVIU C (US); (+1) Applicant:  
EC: A61B5/022 IPC: **A61B5/02; A61B5/022; A61B5/0215** (+3)  
Publication info: **US2006135871** - 2006-06-22
- 3 Integrated circuit memory devices having data output ports that support extended read cycle time intervals**  
Inventor: CHO HYUN-CHUL (KR) Applicant:  
EC: IPC: **G11C7/10; G11C7/10**  
Publication info: **US2006120173** - 2006-06-08
- 4 Data transmission e.g. occupant safety system of motor vehicle, average values formed in equally spaced time intervals serve as input variables in control unit**  
Inventor: AZARKEVICH SERGEY (DE); KUEBLBECK HERMANN (DE) Applicant: CONTI TEMIC MICROELECTRONIC (DE)  
EC: IPC: **B60R21/01; G08C13/00; G08C15/00** (+5)  
Publication info: **DE102005041914** - 2006-03-09
- 5 Method and apparatus for predicting favored supplemental channel transmission slots using transmission power measurements of a fundamental channel**  
Inventor: Applicant:  
EC: H04B7/005B4T IPC: **H04J13/00; H04B7/005; H04B7/26** (+8)  
Publication info: **RU2255424** - 2005-06-27
- 6 Secure unsynchronised bus subscriber data communication procedure matches access time intervals to gaps in other user accesses**  
Inventor: OLENDER GRZEGORZ (DE); SCHEDL ANTON (DE) Applicant: BAYERISCHE MOTOREN WERKE AG (DE)  
EC: IPC: **H04L12/40; H04L12/40**  
Publication info: **DE102004040229** - 2006-02-23
- 7 Adjusting specified time intervals of packets between stations**  
Inventor: STURROCK OLIVER (GB); WENTFORD TIMOTHY JOHN (GB) Applicant: WECOMM LTD (GB)  
EC: H04L12/24C3; H04L12/26M; (+4) IPC: **H04L12/56; H04L12/24; H04L12/26** (+5)  
Publication info: **GB2417387** - 2006-02-22
- 8 METHOD FOR THRESHOLD PARALLEL ALGEBRAIC SUMMATION OF TIME INTERVALS**  
Inventor: MARTYNIUK TETIANA BORYSIVNA (UA); KUPERSHEIN LEONID MYKHAILOVYC (UA) Applicant: VINNYTSIA STATE TECHNICAL UNIV (UA)  
EC: IPC: **G06G7/14; G06G7/00; (IPC1-7): G06G7/14**  
Publication info: **UA73776** - 2004-08-16
- 9 APPARATUS FOR INDEPENDENTLY ASSIGNING TIME SLOT INTERVALS AND READ-WRITE CHANNELS IN A MULTIPROCESSOR SYSTEM**  
Inventor: Applicant: HONEYWELL INC (US)

EC: G06F13/22

IPC: **G06F13/10; G06F9/46; G06F13/22** (+4)

Publication info: **GB1284298** - 1972-08-02

**10 Demodulation of a digitally frequency-modulated analog received signal by evaluation of the time intervals between the zero crossings**

Inventor: BRUCKMANN DIETER (DE); NEUBAUER  
ANDRE (DE)

Applicant: INFINEON TECHNOLOGIES AG (US)

EC: H03D3/04; H04L27/156A; (+1)

IPC: **H03D3/04; H04L27/156; H04L27/20** (+4)

Publication info: **US2005058225** - 2005-03-17

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